Safe Lifting Training for Mexican Parents of Children with a Disability

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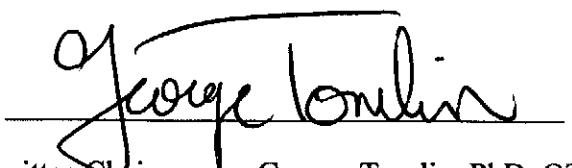
This research, submitted by Cathryn Thierry, has been approved and accepted in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy from the University of Puget Sound.



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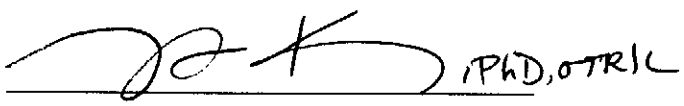

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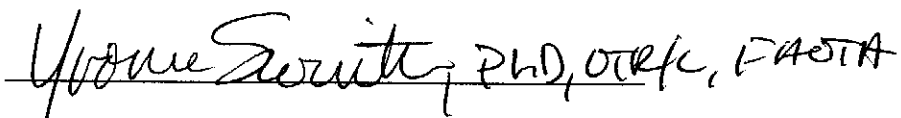

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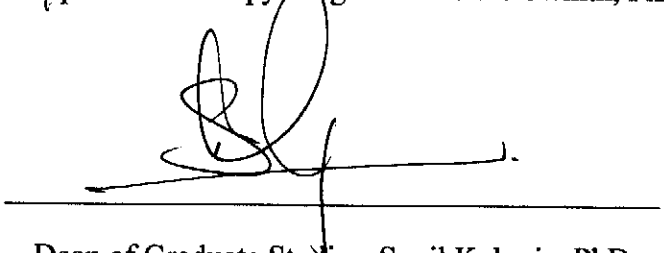

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Abstract

The purpose of this study was to determine to what extent techniques taught during a two-day educational training on body mechanics for lifting and transferring are learned and can be demonstrated by Mexican parents with their children who have a disability. Three parents of children with a disability who attended a culturally relevant educational training on body mechanics lead by graduate occupational therapy students participated in research on their transfer safety. Their body mechanics were observed and scored while they performed up to four transfers prior to and after attending the educational training. Participants performed significantly better on floor transfers after the educational training with a large effect size (d = 2.83). There was no statistically significant difference between pre- and post-tests for bath transfers, and the remaining transfers did not have enough participants to calculate statistical significance. This pilot study had promising results, that using a culturally relevant program, Mexican parents can learn safe transfer techniques. It is important that occupational therapists continue to educate caregivers in how to safely perform a transfer and use multiple methods including verbal instruction, demonstration and practice of real transfers, as well as take into account different cultures and adapt training to be more culturally relevant. Future research is important and could look at a larger sample of participants to see if the training is effective for the other transfer types.

Safe Lifting Training for Mexican Parents of Children with a Disability

Health care workers have a high risk for sustaining on the job injuries. The tasks associated with transferring patients and lifting heavy weight repeatedly throughout the day, for a career spanning decades, creates cumulative exposure and thus compounds effects on the spine and body. The Centers for Disease Control and Prevention (CDC) reported that female workers, nursing aides, and orderlies are at higher risk of sustaining an on the job back injury than any other workers (Bell, Collins, Galinsky, & Waters, 2012).

Caregivers of children with physical disabilities encounter similar high risk situations daily, but rarely if ever have time off from these activities. As the children grow, the care continues for families who cannot afford additional help or to send their child to a group home or facility outside of the home. The increased weight of the children and the continued dependency only increase the daily risk of injury caregivers face when performing activities of daily living (ADL) and transfers. Lack of training not only puts the caregiver at risk, but also the individual being transferred is at risk for falling or sustaining other injuries. If a caregiver is injured this affects the individual with a disability who relies on that person to help him/her throughout the day, thus impacting both individuals' quality of life.

Past research on ergonomics and transfer training has focused on health care workers, specifically nurses and the types of situations they face as well as efforts made to lessen the risk and time lost to work injuries. These interventions include transfer and lifting training courses, facility policies for safe handling and no-lift procedures, as well as the increased development and use of mechanical lifts including Hoyer's or lift teams (Nelson & Baptiste, 2004).

Many studies have shown that these training sessions and policies decrease the incidence of work related injuries. Unfortunately, few private caregivers have the option of using

mechanical lifts or receiving thorough training. If this training were offered to caregivers, they would be better equipped to protect themselves and their family member(s) with a disability.

Background and Significance

Work injuries. An interview survey conducted by the CDC (2006) revealed that more than 25% of adults in the U.S. general population experienced low back pain (LBP) in the preceding three months. LBP itself can lead to individuals missing work and not being able to participate in other activities that are important to them, including leisure, which has been linked to quality of life (Specht, King, Brown, & Foris, 2002). Due to the high prevalence of on the job injuries and LBP, considerable research has been conducted on back pain and injury prevention in the workforce. Specifically, nurses and medical personnel have been examined. Due to the increase of on the job injuries in hospitals, new lifting methods have been introduced including mechanical lifts, sliding boards, gait belts, and other transfer aids to assist with moving patients (Laflin & Aja, 1995). However, after the introduction of these new methods, injuries are still occurring (Laflin & Aja, 1995). This has led many hospitals and facilities to adopt a "no lift policy," and "safe patient handling practices," including mechanical lifts and multiple people lift teams. These policies require access to mechanical lifts and multiple personnel that would be used when the person being transferred needs more help than what the institution deems safe for a single person transfer. This has been effective in decreasing the number of dangerous transfers and subsequent occurrence of LBP and injuries (Nelson & Baptiste, 2004). While this is a feasible and effective implementation plan for hospitals and facilities with a budget, this is rarely a realistic option for individuals who work in the community or in their homes as caregivers.

Interventions. Interventions that have been provided by work sites and other resources include return to work programs, annual hands-on at work training, provision of lift equipment,

video educational trainings, and pain management (Laflin & Aja, 1995; Lieber, Rudy, & Boston, 2000). Some of this research has included people outside the medical profession such as mothers, teenagers and other workers. McCauley (1990) taught a small number of teenagers safe lifting techniques related to on-the-job tasks. The teenagers successfully learned the techniques, and demonstrated them later on the job, when they did not know they were being observed. Another study by an occupational therapy student involved teaching body mechanics and safe lifting techniques to pregnant mothers to use with their babies, using an interactive video tutorial format to present the information and observed the mothers performing the specifics tasks using dolls (LaVilla, 1995). The women varied on the number of existing children they had and thus their experience in childrearing tasks and lifting habits. LaVilla recorded their demonstrating the learned techniques via a video, which limited proper analysis from all angles. All participants improved on lifting tasks with the doll. Thus the video tutorial appeared to be a successful method in teaching these women techniques that could be used later when they were raising their child with or without a disability.

Holmes, Lam, Elkind and Pitts (2008) used a video in Spanish, demonstrations, and job related practice to teach fruit warehouse workers and students body mechanics. The students and workers both improved in post test scores and demonstrations. Groups receiving job specific practice and feedback scored significantly higher on the body mechanics evaluation, which is consistent with previous research (Holmes et al., 2008; McCauley, 1990).

The results of Carlton's (1987) research on food service workers somewhat conflicted with the previous studies in that the group that received body mechanics instruction performed significantly better on a specific task compared to the group that received no instruction; however, when performing various on-the-job tasks, there was no significant difference between

the groups. Overall, the research suggests that going through some type of education or training is better than receiving none, therefore, it would be beneficial for caregivers to receive training with the possibility that it might make their work safer.

Caregivers. The permanent role of being a caregiver for a family member with an irreversible disability can cause psychological and physical distress (Glozman, 2004). In the U.S. there are over 50 million caregivers for people with disabilities and chronic illness, 16.8 million of whom provide care to children under the age of 18 with special needs (National Alliance for Caregiving & American Association of Retired Persons, 2009a; National Alliance for Caregiving & American Association of Retired Persons, 2009b). The research by the National Alliance for Caregiving and AARP was conducted using surveys, and although their results were consistent with other research, the results were all based on caregiver opinions and did not identify causes of injuries and LBP. Tong et al. (2003) reported that caregivers of children with physical disabilities have a higher prevalence of LBP and lower physical functioning than caregivers of children with a medical disability who are not physically affected, especially when performing transfers. Seventy-two percent of caregivers of children are reported to be female and are less likely to be caring for just one person (National Alliance for Caregiving & American Association of Retired Persons, 2009b). In the U.S. and Mexico, women are the primary caregivers in the home, which makes it important to consider what they can do physically when assessing burden of care and limitations when performing caregiving tasks. Women on average can tolerate only 67% of the spinal compression tolerated by men, and as they get older this strength decreases (Laflin & Aja, 1995). The average safe lifting weight reported for women is 36.4 pounds which is difficult to not exceed as a child ages and the caregiver is still required to lift most of their weight (Snook & Ciriello, 1991). Because women are not physically as strong as men and thus

more easily injured, it is important for them to learn proper lifting techniques to protect themselves.

About half of caregivers of children are reported to be the sole caregiver of the child and they are also reported as having a higher burden of care when compared to caregivers of adults (National Alliance for Caregiving & American Association of Retired Persons, 2009b). Caregivers are sometimes called "secondary patients" as they also are at risk for injury and sometimes need protection and guidance (Reinhard, Given, Petlick, Bemis, 2008). Most sole caregivers will not have a backup plan or choice when they are faced with a difficult transfer or situation. For this reason, they would be even more likely to sustain an injury or experience LBP. Caregivers' health and well-being can deteriorate as they often neglect their own health needs when assisting their family member (Reinhard, et al., 2008). If the caregiver of a child is injured or experiences LBP to the point that she or he cannot care for the child, it can negatively affect the quality of life of both the caregiver and the child. A child with a disability with an injured caregiver would be hindered from participating in both everyday ADL as well as leisure activities. Leisure has been linked to quality of life and requires the ability to be able to access recreation and activities both within and outside of the home. Despite caregivers of children having a higher reported burden of care than caregivers of adults, little research has been performed to address caregivers of children specifically (National Alliance for Caregiving & American Association of Retired Persons U.S., 2009b). Most of the research has been performed on caregivers of adults with a disability such as a stroke or a dementia related disease (Glozman, 2004; Hinojosa & Rittman, 2009).

Eighty-five percent of caregivers of children and 77% of caregivers of adults report that they need more information related to caregiving (National Alliance for Caregiving & American

Association of Retired Persons U.S., 2009a). Specific research done on caregivers of stroke survivors show that they do not receive adequate education on how to provide care for their family members (Hinojosa & Rittman, 2009).

In Mexican culture, family is the most important thing, and a woman is what holds it together. In Mexico, women are socialized into roles that define caregiving as a woman's responsibility. In a survey of Mexican caregivers of the elderly, 27 of 41 caregivers viewed themselves as guardians of their relatives' health (Mendez-Luck, Kennedy, & Wallace, 2009). This family role and the importance put on childrearing have given women the primary role as caregiver in the home in Mexico (DiGirolamo & Salgado de Synder, 2008). Women in Mexico who have children with special needs are often blamed by society for their child's health and are often abandoned by the father (Jeff Lair, personal communication, August, 31, 2012). For the purpose of this study, the intervention will be targeted at parents in general as we want to include fathers if they are interested in learning techniques as well.

Effective training. The current study will focus on training in body mechanics and safe lifting techniques. Glozman (2004) wrote that it is important during caregiver training to provide support in the form of material, financial help, advice, psychological support and respite. The meaningfulness of the task is also important when teaching new skills, and should be considered during lifting and transfer training (Trombly, 1995). For training to be effective, it should incorporate multiple methods of learning as well as be directly relevant to those tasks the caregivers must perform (Lujan & DiCarlo, 2006).

Occupational therapy in body mechanics. Occupational therapy focuses on "supporting health and participation in life through engagement in occupations" (American Occupational Therapy Association, 2008, p. 628). Being a parent is an important role in many people's lives

and is within the scope of occupational therapy under the domain of instrumental activities of daily living (IADL). Parents often acquire a greater role as a caregiver for their child if the child has special needs.

Occupational therapists regularly work with healthcare workers, people with disabilities and their families to train them in proper lifting and transfer techniques. Successful interventions will teach caregivers how to work with their children as safely as possible when performing ADL and lifting and transfers. Trombly (1995) wrote that "purposefulness organizes and meaningfulness motivates" (p. 970). An occupational therapist functions with this in mind during treatment. Therefore, it is imperative when training caregivers to not only teach the techniques, but somehow make it meaningful and purposeful so that it is effective.

The centennial vision of occupational therapy states that occupational therapy will be "…a powerful, widely recognized, science driven, and evidence-based profession with a globally connected and diverse workforce meeting society's occupational needs" (Moyers, 2007, p. 623). The global component requires that occupational therapists be involved with issues at a worldwide level.

Disabilities in Mexico. In Mexico there are practicing occupational therapists, although the educational and licensing requirements differ from those in the U.S. It is reported that there are between 80 and 300 practicing occupational therapists working in Mexico (Crowe, 2003), and that 1.8% of the population (1,795,000 people) has a disability (Disability information and news, 2012). Disability rights in Mexico are inconsistent. Mexico is currently active in the United Nations regarding disabilities and is in the process of legislating federal policy, however, there are few regulations and little enforcement (Disability information and news, 2012). Awareness of disability rights in Mexico is rising but is still low overall. Children with

disabilities are able to attend school as long as they are not a physical burden to the teacher (Jeff Lair, personal communication, January, 8, 2012). About 15% of children with a disability ages 15 to 29 have an education (Disability information and news, 2012).

Culturally competent training in Mexico. When working with another culture, it is important to provide education in a format that can be understood by the participants. According to the CDC's ethnographic guide on tuberculosis education, in order to provide culturally competent education to Mexican patients, instructors must take time to establish rapport, have interaction and materials in Spanish, and ensure there are adequate bilingual staff available. Successful training and education programs have used telenovelas or video stories, cafecitos or social discussion groups, and picture books similar to comic books, called fotonovelas (Crist, 2005; Dillon, 2007).

Literacy and education levels are important to consider when creating reading materials for a population. In Mexico literacy has improved over the past 35 years. For people age 15 and older, literacy rose from 74% in 1970 to 89% in 2004 (U.S. Department of the State, 2004). In general education, 70% of the Mexican population does not have a high school diploma or equivalent, compared to 22% of the U.S. population (U.S. Department of the State, 2004).

Caregiver training in Mexico. Padres y Compadres, located in Mazatlan, Mexico, is a co-op of mothers and their children with disabilities. It is a place they can go to eat meals, use the therapeutic facilities, and perform ADL including showering and toileting in an accessible setting (Jeff Lair, personal communication, January, 8, 2012). Currently at Padres y Compadres the mothers perform daily caregiving tasks with their children, but they have not received any specific education or training as to how to do this safely. Sometimes when performing transfers, the mothers lift by pulling on their child's arms, causing over 90 degrees of shoulder flexion,

which can cause injuries to the child's shoulder joint (Bree Lair, personal communication, February, 15, 2012). The mothers often rely on back braces to protect themselves, which has been found in the U.S. not to be associated with reducing LBP or injuries (CDC, 2012). These women and their children could benefit greatly from an intervention to teach them safe lifting and transferring techniques. The unique circumstances of Padres y Compadres allows a researcher to observe and intervene in a natural everyday setting where parents bring their children instead of having to go into their homes. The purpose of this study, therefore, is to determine to what extent techniques taught during two, 3-4 hour sessions, in an educational training on body mechanics for transferring, can be demonstrated in the short term by Mexican parents who have a child with a disability.

Method

Design

This pilot study was quasi-experimental with a pre- and post-test, focusing on the outcomes data of an educational training on body mechanics. Due to the time constraints and feasibility requirements to complete the study, an experimental research study was not a realistic design. The goal of this study was to see if the techniques taught could be demonstrated. The independent variable was the educational program; the dependent variable was the number of negative techniques that were used during transfers. Participants were observed performing transfers and lifts that were the everyday transfers they did with their children.

Participants

To be included in the research study, participants were required to participate for 3-4 hours in each of two days of educational training, as well as both the pre- and post-educational training data collection days. Three people, described below, completed all stages of the study.

Additionally, 19 total people participated in the educational training, but were not included in the data analysis because they either did not meet the inclusion criteria or were not approached to participate in the research study. The inclusion criteria were having a child with a physical disability to whom the participant provided physical assistance for transfers, having basic reading skills, and having no recent injury or physical disability that made it unsafe for the person to perform transfers. The participant needed to be present for all parts of the study, including demonstrating the different transfers with his or her child in front of an observer, for his/her data to be included in the analysis. Additional participants in the educational training were staff members from Padres y Compadres who did not have their own child, community members, and staff from a nursing home in Mazatlan.

The population of interest was Mexican parents of children who had a disability. The participants who completed all four parts in this study consisted of three people (one male), who had children with a physical disability. In order to perform a dependent *t*-test and detect an effect 80% of the time if there is one, a sample size of about 12 would be needed (Tomita, 2006). This estimate was based on a similar previous study (La Villa, 1995) that had an effect size of 2.0 when comparing pre- and post-test scores of women demonstrating transfers.

The participants were a convenience sample, selected based on their child's attendance at Padres y Compadres. The participants were given the choice to participate in an educational training related to body mechanics taught by occupational therapy students. Researchers approached the participants at Padres y Compadres who were identified by the on-site head nurse, as wanting to participate in the educational training. The researchers talked to the participants using a pre-written script to determine if they were willing to participate in the research. The

participants lived in and around Mazatlan, Mexico. See Table 1 for additional demographic information on the participants.

Instrument/apparatus

The author created a checklist based on current research on proper lifting techniques and procedures, such as keeping weight close to the body, maintaining a wide base of support, and keeping the spine straight while lifting and carrying. To assess the level of safety of the transfer, this tool was used by four student observers while the mothers performed the four different transfers. Prior to collecting actual data, an instrument pilot was performed to test the sensitivity and inter-rater reliability of the checklist. The students who observed the transfers watched videos of a person performing various transfers using dolls and used the checklist to practice rating the transfers. The team of student observers compared their ratings and they calibrated their observations until they were consistent 80% of the time or greater. The checklist was evaluated after using it in the video training. Based on the evaluation, the checklist was adapted by the researcher to ensure sensitivity of the instrument: if there was a difference in transfer safety, it would be reflected by the checklist (see Appendix for checklist). Adaptations included removing a category that was not relevant in all situations and was more of a technique in safe lifting than a principle. Also, some categories were made more specific, with parameters to classify duration and number of behaviors and what exactly raters needed to see for each score. Participants were rated on specific criteria with scores ranging from 0-2. The higher a score, the worse a participant performed in that area.

Procedure

The university institutional review board (IRB) approved the current study. The data collection and educational program took place at the Padres y Compadres campus in Mazatlan,

Mexico. As part of a related Master's thesis project, an educational program on body mechanics and transferring was created and lead by Tara Curtis (2013), an occupational therapy student. The training was conducted by occupational therapy students, and was overseen by a licensed OTR during the entire process to ensure that procedures were implemented safely as approved by the IRB. Parents who used Padres y Compadres for services were informed that students were coming with Push International to volunteer and that they were doing training on safely transferring children with disabilities. Once students arrived, they talked to the head staff at Padres y Compadres using translators about the educational training training. The staff then provided students with a list of people who wanted to participate in the program. The researchers then approached the parents regarding the research component. The head student researcher used a script and a consent form. The parents received a written description in Spanish of the program and research prior to consenting and were asked if they had questions or would like the consent form read to them. They were told that observers would watch them perform transfers with their children on two days. They were told the schedule of the protocol: 20-minute observations on each of two days before and after the program where they received training on proper lifting techniques. It was also explained that they could still participate in the program without participating in the research study so that they did not feel compelled to volunteer. Parents who decided to participate were asked to sign consent forms that were translated into Spanish. After consent forms were signed, the participants received an identical copy.

For two days prior to collecting data, researchers interacted with the women and children on site at Padres y Compadres in all environments including the areas where data collection later occurred. This was done to reduce the possibility of a Hawthorne effect (Franke & Kaul, 1978), decreasing the women's awareness of the presence of the student researchers and eliciting more

normal behavior. To obtain a baseline, student researchers began by collecting pre-program data on the specific transfers the parents performed with their child at the Padres y Compadres campus. Each participant was observed for no more than 20 minutes. Participants were observed performing between one and four different types of transfers with their child: wheelchair to/from toilet transfer, wheelchair to/from floor transfer, wheelchair to/from shower bench, and wheelchair to/from chair (or highchair depending on age). The number of transfers they performed depended on what was relevant for them and their child. For example, if the child did not use the toilet when going to the bathroom, the participant did not perform a toilet transfer. As participants arrived on site to drop off their children, they were assigned an observer by the researcher and then asked to perform the transfers. The observer took the participant to different locations, and observed the different transfers in the areas. The observers did not provide any verbal cuing aside from asking the participant to move his/her child from one surface to another. The observers recorded on the checklist the behaviors observed in order to score performance at the end of the session. A total of seven people participated on day one of the data collection.

Starting the next day, participants attended a two part, two day educational training led by four occupational therapy students that lasted 3-4 hours each of the two days. The overall format was a combination of verbal and visual presentations. A PowerPoint presentation on proper body mechanics and safe lifting was presented. In order to provide a culturally relevant training, the students had translators and provided comic style fotonovela handouts with a story and images consistent with situations in Mexico. There were also visual demonstrations, and time where participants practiced simulated transfers using weighted sacks ranging from 5 to 35 lbs. They were also educated about the research in the U.S. indicating that without education and the use of proper techniques, back braces are not effective in injury prevention during lifting (CDC, 2012).

The presentation was divided into three subsections, (1) health and well-being for the parents, (2) introduction to proper body mechanics, and (3) body mechanics in daily routines. The second day consisted of hands on practice and one on one instruction in proper lifting techniques at different stations while transferring their child. The stations included a floor to/from wheelchair transfer, toilet to/from wheelchair, shower table/bench to/from wheelchair, and a chair or high chair to/from wheelchair. These were practiced using the exact equipment and spaces in which these transfers occurred at Padres y Compadres.

Some participants had questions about specific situations in their homes and were given techniques and advice for those situations. After practicing transfers until the participants performed them safely, the participants took a short quiz on what they learned from the educational training, and upon completion, the participants received a certificate for completing the training. The purpose of the quiz and certificate was to motivate the parents to continue to use the techniques they learned. In Mexico, having a certificate is highly regarded and is likely to encourage participation and continued use of techniques (Jeff Lair, personal communication, August, 31, 2012). For more detailed information on the educational training, refer to Tara Curtis' thesis paper (2013). Those individuals involved in the research study were asked to return the following day to perform transfers in front of researchers.

Data collection occurred the day following the last day of the educational training. On the final day of data collection, three participants were observed upon arrival to Padres y Compadres with the same checklist as the one used during baseline observations. They were assigned an observer, different from the person who observed baseline transfers, and were asked to perform the same transfers with their children that they did on the first day.

Data analysis

After data collection, the total number score for each transfer was calculated from pre and post days of data collection, giving each individual and each transfer a total score. Descriptive statistics were calculated (range, mean and standard deviation). Dependent *t*-tests were used to compare pre- and post-test scores to detect any difference. To determine if demographic variables interacted with transfer performance, the association of weight and height of child, and weight and height of mother with transfer performance were examined.

Results

Participants

A total of seven participants, six mothers and one father, agreed to participate in the study and signed consent forms. Of the seven participants, three (two mothers and one father) completed the four-day research study (Table 2). All three were parents of children with disabilities who used the services of Padres y Compadres. The three participants' ages ranged from 25 – 52 years and their children's ages ranged from 2 – 25 years. All of the children had a diagnosis of cerebral palsy and were from a single parent home. During the data collection, participants were asked to perform four different types of transfers, but not all of the four transfers were relevant for each individual. Some children had very high spasticity or limited range of motion in their hips and spine, which limited the positions they could be in unsupported. Of the four different transfer types that were performed, the floor transfer was the only one that was relevant and performed by every participant.

Performance Outcomes

Possible scores for transfers ranged from 0 – 16. Table 3 illustrates the pre- and post-tests scores for floor transfers. The mean scores for pre-tests were 4.7, 4, 4, and 4.5 and the post-

test mean scores were 1.3, n/a, 2, and 1.5, with lower numbers meaning better performance and with no one performing the toilet transfer in the post test. The mean scores on safety of each type of transfer overall did not differ significantly between transfer types (Table 4). Standard deviations for each transfer (Table 4) ranged from 1.38 to 2.45.

In general for the pre-test, participants performed well in the categories of keeping their back straight and flexing their knees. Most of the problems were twisting the back, not keeping the weight close to the body, not locking the wheelchair locks and the transfer surface being too far away. On the post-test, most of these were corrected, however, many people still forgot to lock the wheelchair brakes. Descriptive statistics as well as dependent *t*-tests and correlations were calculated comparing the before and after scores for each transfer category. Overall, the three participants who completed the study improved in their scores in every transfer they performed (see Table 4). Dependent *t*-tests yielded results for floor and bath transfers only, as one or no participant performed transfers in the post-test for chair and toilet transfers. The floor transfer group, which had three participants in the end, had a $t(2) = 4.9$, $p = 0.039$ meaning the group performed statistically significantly better after receiving the educational training than they did before it (see Table 4). The bath transfer, which had two participants in the end, yielded a $t(1) = 7.0$, $p = 0.09$, meaning the group did not perform statistically significantly better after receiving the educational training. Effect size for floor transfers using Cohen's calculation was $d = 2.83$, meaning that for transfer scores after the educational training, on average, participants scored 2.83 standard deviations above the average of the scores they received prior to the educational training, which is a large effect size.

A comparison of the parent and child's demographics with performance on transfers yielded no significant relationships. For floor transfers scores on the pre-test, there were no

significant correlations of participant height and weight or the height and weight of the child they were transferring with the score that was received on the transfer (Table 5). Despite correlations not being significant, correlation coefficients that were 0.5 or higher were parent height, child height, and child age. These were positively correlated with a higher transfer score, indicating an unsafe transfer. This means that as parent height, child height, and child age increased, the transfer was more likely to be rated as being unsafe.

Discussion

Interpretation of Results

Overall, the educational training participants were able to successfully demonstrate improved safety in their body positioning when performing transfers, compared to their performance prior to attending the educational training. According to a comparison of means, both floor and bath transfer groups performed better. A dependent *t*-test calculation showed that the floor transfer groups performed better in the post-test, which is consistent with La Villa (1995). Based on the significance level being close to 0.05 and the sample size being small, it is possible that a larger group would have yielded statistically significant results in bath transfers and possibly the other transfers. There was a large effect size calculated for the floor transfers but with a small sample there was low power. This means that it is more likely for the researcher to not find a significant difference when there is one, as may be the case with bath transfers, where there was not a statistically significant difference but there were notable changes in pre- and post-tests scores. Based on the large effect size for floor transfers, it is likely that similar populations would strongly benefit from a similar educational training.

There were no significant relationships between the demographic variables and performance on transfers; however, this could also have been due to the small sample size.

Trends that appeared included the variables of parent height, child height, and child age, all being positively associated with a higher (less safe) transfer score. This is interesting as one might expect a child's weight to lead to a less safe transfer rather than their height, but this correlation was not seen. A possible explanation for the impact of height is that a taller person transferring a child, especially a child who is tall, may have a more difficult time due to having a higher center of gravity, especially during floor transfers.

Throughout the educational training program the participants seemed to be very engaged. The training was planned to only last about two hours each day but went on for four hours due to the number of questions, and the amount of discussion and practice desired by the parents who participated. People seemed eager to learn and expressed frustrations about the difficulty of transfers. Not every participant complained of injuring themselves or their back, however, all reported caring for their child directly more than 8 hours a day. As the participants moved through the process they seemed to understand the material, as demonstrated by their incorporation of feedback during practice sessions as well as their critique of each other in groups while they practiced transfers for example, when someone had a curved spine or forgot to lock the brakes. The participants also reported being happy about receiving a fotonovela and the other information in print as well as the diplomas upon completion of the training, indicating the importance of the cultural relevance of the training. The fact that people were motivated to learn and saw this as an area that was important to them most likely contributed to their level of success and learning during the two-day educational training.

Limitations

Limitations included a small sample size, not all transfers being assessed, possible observer bias, use of an untested measuring instrument, and the research data being collected

over a short period. A small sample size limits the ability to generalize to other populations and to find a significant difference if there is one. Due to feasibility, research in another country and time constraints, the researcher was unable to recruit a large sample of participants. It is also possible that some observer bias occurred as it was difficult to control for the Hawthorne effect as the observer was one on one with the participant and asked him/her to perform certain transfers. The participants would most likely want to perform well for the observers, and would make sure that they performed their transfers safely. Research observers were blinded to the pre-test scores of the participants when taking post-test data and the point of this study was that the participants were able to demonstrate the techniques to show that they learned them. Therefore the fact that they were able to demonstrate safer techniques after the educational training and that the observers were unaware of their prior performance means that it is likely that they learned new techniques and could apply them.

The instrument used to measure the safety of the transfers was created by the researcher and had not been used before (see Appendix). Therefore, the validity of the instrument is unknown. This was the only assessment used as well and thus these results could not be compared to any other test that evaluates the same or similar thing. Four transfers were planned to be assessed because it was assumed that the parents performed each of these transfers with their child. Most of the parents used the floor transfers but rarely used the toilet or chair transfers due to the postural instability or fixed positioning their child had. Data were taken the day after the educational training; therefore these results cannot be generalized to be long-term effects.

Future research

If a future study were done with this population, it would be important to provide advance notice and give multiple options for educational training times so that people don't have

to miss work, which was the primary reason giving for missing sessions in this study. Also if this study could be opened up to caregivers instead of just parents, it would be interesting to see if the results would be the same. It is also important to allow for more time to practice transfers so that training can be personalized. More research is needed with a larger sample size and more time between the educational training and the post-data collection or possible follow-up or longitudinal studies could be done to see long term effects of the learned skills.

Implications for occupational therapy

Occupational therapists work with both clients and their families and caregivers. With 85% of caregivers of children and 77% of caregivers of adults reporting they do not have enough information on caregiving for their family members (National Alliance for Caregiving & American Association of Retired Persons, 2009a), it is important that occupational therapists include caregiver training in their therapy and make it a priority for discharge planning.

This research shows that caregivers can be trained on how to care for their children more safely in a relatively short period of time. This is important and should be considered when working with clients who have a physical disability and need assistance. Effective training can not only protect the client, but also allow the caregivers to stay healthy longer and continue to provide care. This study shows that body mechanics education, when delivered in a culturally relevant manner, has promise in aiding people in improving their safety with transfers. A goal of the American Occupational Therapy Association is to be more global (Moyers, 2007) and this research shows that an international training program can be successful. Therefore more training like this should be tried with caregivers around the world in many languages.

Conclusion

With caregivers having an increased level of burden and thus higher risk for injury, (National Alliance for Caregiving & American Association of Retired Persons, 2009b) it is important that people are trained in how to safely transfer someone with a physical disability. The current study demonstrated that a two-day training on proper body mechanics that is culturally relevant can effectively improve the safety of performance on transfers in the short term. Overall, the transfer scores of all the participants improved after the intervention and improvements were statistically significant for floor transfers despite the small sample size. Future studies should be performed with a larger population to see if these effects are long term and beneficial in different settings and with different transfers. Through the use of adaptation of instruction materials to fit the cultural norms and multiple avenues of presentation including verbal, demonstration and practice, and safe-lifting techniques can be taught in another culture and these techniques can be learned.

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Appendix

Participant # _____ Location:_____ Transfer type:_____ Date:_____

Behavior	Score	Comments
Lock wheel chair brakes		
Transfer surface no more than 1ft away If greater than 1 ft: 1 = 2-3 steps, 2 = >3 steps		
No twisting of spine		
Smooth motions, no fast or jerky movements		
Feet are shoulder width apart		
Bend knees and hips, back is straight		
Child is held between shoulders and hips during transfer		
No empty space between mother and child during transfer (1 and 2 given for time frame that there was space)		

Scoring
0 – never did unsafe
1 – did it 1-2 times or some part of the transfer but not more than half of the time.
2 – did it greater than 2 times or most of the transfer.
N/A – not applicable to this transfer
*Some transfers will have certain specifications listed in them for scoring.

Table 1

Demographics of Participants

	Parent			Child		
	Age years	Height " (m)	Weight # (kg)	Age years	Height " (m)	Weight # (kg)
Mean	31.6	62 (1.6)	137 (62.3)	9.8	43.3 (1.1)	32.8 (14.9)
Minimum	25	56 (1.4)	119 (54)	2	31.5 (0.8)	2 (4.4)
Maximum	52	71 (1.8)	183 (83)	25	59 (1.5)	121 (55)

Table 2

Attrition table

Day	Number of participants
1	7
2	4
3	4
4	3

Table 3

Pre- and Post-test scores for each participant in floor transfers

Participant	pre	post
1	2	-
2	3	-
3	4	-
4	7	3
5	7	-
6	4	1
7	6	0

note: a lower score means less errors with a total maximum score of 16. Standard deviations for pre-test = 1.98, and post-test = 1.53.
Some participants did not complete the educational training and/or attend the final data collection day.

Table 4

Comparison of pre and post scores of transfers

	Mean Score		Standard Deviation		Dependent *t*-test		
Transfer type	pre(n)	post(n)	pre	post	*t* value	df	*p* value
Floor	4.7 (7)	1.3 (3)	1.98	1.53	4.9	2	0.04
Toilet	4 (1)	2 (1)	-	-	*	*	*
Chair/High chair	4 (4)	0 (0)	2.45	-	*	*	*
Bath	4.5 (6)	1.5 (2)	1.38	2.12	7.0	1	0.09

note: a lower score means less errors with a total maximum score of 16.
* = *t*-tests could not be performed on toilet and chair transfers as there was not enough data.

Table 5

Correlations of participant demographics with floor transfer pre-test performance (n=7)

variable	*r*	*p*
parent height	0.59	0.16
parent weight	0.38	0.41
parent age	0.45	0.31
child height	0.59	0.17
child weight	0.14	0.76
child age	0.55	0.20

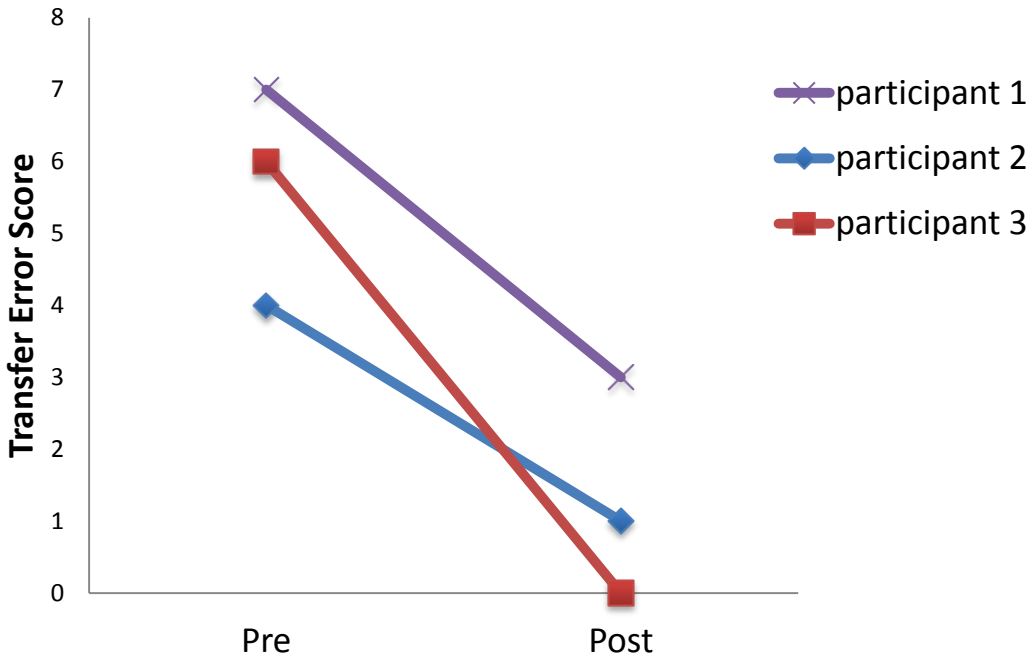

Figure 1. Pre and post test score comparisons of floor transfers by the three participants who completed the study. Participant 3, scored a 0 on the post test transfer. Lower scores mean superior performance.